

CLAIMS

1. A method for producing carbon monoxide by cryogenic distillation comprising the following steps:

5           i) a gas mixture (1) containing carbon monoxide, hydrogen and nitrogen is cooled and partially condensed to produce a cooled and partially condensed gas mixture

10           ii) the cooled and partially condensed gas mixture (5) is separated to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid

15           iii) a stream of the carbon monoxide-enriched liquid is sent to a stripping column (17) to produce hydrogen-free liquid carbon monoxide and hydrogen-enriched carbon monoxide gas

          iv) a stream (19) of the hydrogen-free carbon monoxide is sent to a first intermediate level of a distillation column (23)

20           v) a liquid stream, richer in methane (27) compared to the stream feeding to the distillation column, is withdrawn from the bottom of the distillation column

25           vi) a carbon monoxide-rich stream (29) is withdrawn from a second intermediate point, the second intermediate point being above the first intermediate point

30           vii) a stream, enriched with nitrogen and optionally hydrogen compared to the stream feeding to the distillation column, is withdrawn from the top of the distillation column.

2. The method as claimed in claim 1, in which the carbon monoxide-rich stream (29) withdrawn from the distillation column is a liquid stream.

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3. The method as claimed in either of claims 1 and 2, in which a carbon monoxide cycle (Q1, Q2, Q3) cools the top of the distillation column (23) and/or

heats the bottom of the distillation column and/or heats the bottom of the stripping column (17).

4. The method as claimed in one of the preceding claims, in which cycle carbon monoxide is expanded in a turbine (37).

5. An installation for producing carbon monoxide by cryogenic distillation comprising:

10 a) a heat exchanger (3) for cooling and partially condensing a gas mixture (1) containing carbon monoxide, hydrogen and nitrogen to produce a cooled and partially condensed gas mixture (5)

15 b) a separator (7) for separating the cooled and partially condensed gas mixture to produce a hydrogen-enriched gas and a carbon monoxide-enriched liquid

20 c) means for conveying the cooled and partially condensed gas mixture from the heat exchanger to the separator

d) a stripping column (17) and means for conveying at least part of the carbon monoxide-enriched liquid thereto

25 e) means for withdrawing a hydrogen-enriched gas from the top of the stripping column and means for withdrawing a hydrogen-free liquid (19) from the bottom of the stripping column

30 f) a distillation column (23), means for sending a stream of the hydrogen-free liquid to a first intermediate point of the distillation column, means for withdrawing a bottom liquid (27) from the distillation column, means for withdrawing an overhead gas (RSD N2) from the distillation column and means for withdrawing an intermediate fluid (29) at a second intermediate point of the distillation column, the  
35 second intermediate point being above the first intermediate point.

6. The installation as claimed in claim 5, in which the distillation column (23) has a top condenser and/or a bottom reboiler.

5           7. The installation as claimed in either of claims 5 and 6, in which the stripping column (17) has a bottom reboiler.

10           8. The installation as claimed in either of claims 5 and 6, in which the column (columns) is (are) heated and/or cooled using a carbon monoxide gas cycle.